FOUNDATIONS OF

MATERIALS SCIENCE AND ENGINEERING



This book is printed on recycled, acid-free paper containing 10% postconsumer waste.

Copyright © 1993 by McGraw-Hill, Inc. All rights reserved. Portions of this text have been taken from *Principles of Materials Science and Engineering*. Copyright © 1990, 1986 by McGraw-Hill, Inc. All rights reserved. Printed in the United States of America. Except as permitted under the United States Copyright Act of 1976, no part of this publication may be reproduced or distributed in any form or by any means, or stored in a data base or retrieval system, without the prior written permission of the publisher.

34567890 DOC DOC 90987654

0-505P20-0 N8ZI

This book was set in Cheltenham Light by Waldman Graphics, Inc.

The editors were B. J. Clark and Jack Maisel;

the production supervisor was Leroy A. Young.

The cover was designed by Caliber/Phoenix Color Corp.

R. R. Donnelley & Sons Company was printer and binder.

Graceful failure (800X). A computer-enhanced fracture surface image of an aluminum oxide matrix composite reinforced with Nicalon silicon carbide fibers demonstrates strain-induced fiber pull-out behavior that helps the material resist crack propagation, resulting in graceful noncatastrophic failure.

(Courtesy Lanxide Co.)